AN EXPERIMENTAL STUDY IN DEVELOPING HISTORY READING ABILITY WITH SIXTH GRADE CHILDREN THROUGH DEVELOPMENT OF HISTORY VOCABULARY

A DISSERTATION

SUBMITTED TO THE BOARD OF UNIVERSITY STUDIES OF THE JOHNS HOPKINS UNIVERSITY IN CONFORMITY WITH THE REQUIREMENTS FOR THE DEGREE OF DOCTOR OF EDUCATION

1938

BY

WILLIAM RODGERS PHIPPS

(Reprinted from "The Johns Hopkins University Studies in Education," Number 28)

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PREFACE

The problem of teaching reading is a complex one, since reading is a complex ability, conditioned and determined by a number of factors related to it. If the true nature of reading could be comprehended it is conceivable that more effective teaching methods could be devised.

There appears to exist among teachers of reading in schools and among writers upon the teaching of reading the belief that the ability to read is a general ability which operates with equal facility and effectiveness with a given individual in all types of reading material. This belief expresses itself in the prevailing methods of teaching children to read printed materials related to the various subjects which constitute the curricula in the elementary schools.

During the writer's teaching experience which has included working directly and indirectly with children in all grades of the elementary school, he has always worked on the assumption that there are certain conditions and abilities which, in integration, provide a readiness for reading, and which make it possible for the reader to comprehend and interpret the material read. This applies not only to different levels of reading but also to reading in various subject matter fields.

Since the basic measure of effective reading is the character and degree of meaning which is realized by the reader as a result of interpreting printed symbols, it is essential that the reader be provided with correct meanings underlying the symbols. Since meanings and concepts are carried by words, it would seem, then, that language, "the shorthand of the higher thought processes," as Terman calls it, bears an important relation to reading. The active vocabulary of a reader, in this sense, is defined as being composed of those words which he can perceive and recognize, and with which, at the same time, he can build meanings.

Accepting this as a basic assumption, the writer has erected the hypothesis that the ability to read sixth grade history material can be improved by developing in pupils the ability to use the vocabulary of sixth grade history with correct

meanings in written expression. It seems reasonable to believe that if ideas are clarified through language, and meanings and concepts are crystallized in language that the problem of teaching reading should be approached through language.

The most gracious office of a preface is that it permits the expression of gratitude to those who have been of service to the writer. Accordingly, I should like to acknowledge with real appreciation the assistance, guidance, and excellent suggestions which have been given so generously and cheerfully by Dr. Florence E. Bamberger, Dr. John M. Stephens and Dr. Arthur Lichtenstein who constituted the committee which guided this investigation. In addition to my indebtedness to Dr. Bamberger for her help on this particular study I am also indebted to her for the inspiration which she has furnished through the many courses which I have had with her from the time of my early undergraduate days to the present.

In the particular approach to the problem of developing reading ability emphasized in this study, Dr. M. Theresa Wiedefeld, President of Maryland State Teachers College at Towson, will see her influence, for she, as my first superviser, laid the basis of the psychology of reading reflected in this investigation. Her continued friendship, interest, and encouragement have helped to make this study possible.

Sincere thanks are due Mrs. Lillian Price French, Miss Margaret Hankins, Mrs. Kathleen Sharp Turner, Miss Norma Louise Leonard, and Mr. Raymond Jump, teachers in the Talbot County schools who willingly and conscientiously cooperated in carrying forward the experiment presented in this study. I acknowledge the gracious service rendered by Miss Bessie C. Stern, Statistician, Maryland State Department of Education, in reading the manuscript and checking the statistical data. To Raymond Jump of St. Michael's, Maryland, who has continually given his aid in manipulating the statistical data, I express my gratitude. Finally, I am grateful to Mr. J. Willard Davis, Superintendent of Schools in Talbot County, Maryland, and to the Board of School Commissioners of that county for their making the undertaking of this investigation possible.

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CHAPTER I

The Nature of Reading

This investigation is based on the assumption that the ability to perceive meanings in words and the ability to use the vocabulary of a subject are conditioning factors of the ability to read that subject. Specifically, it is assumed that if pupils on the sixth-grade level can be trained to use history vocabulary with meaning and understanding they will be able to read history material intelligently.

The reading experiences of an individual constitute the third stage of his total language experiences. First, the child learns to comprehend spoken language-forms when he hears them. Later, he develops to the stage where he engages actively in the oral use of words in order to convey meanings and to secure meanings from his environment. Finally, he is exposed to print which is the visual form of language.

During all this time the child has come in contact with certain aspects of his social heritage and has learned to comprehend, either partially or wholly, certain phases of culture. These elements of past and present, social and personal living have become crystallized in words and other language patterns, certain ones of which have become a part of the individual's listening vocabulary, and certain ones of which have become a part of his speech, with the natural overlapping of these two. When the individual learns to connect the oral form of words with their visual form, he associates with the print the meanings and ideas for which the oral form stands, and he reads out of the visual forms the meanings which he has carried to them.

Since each individual's experiences and comprehension of experiences are unique, the meanings which a reader will derive from visual perception and recognition will differ from those secured by another reader. In this manner the print which one reads dictates the previous experiences and the

elements of these experiences upon which one must draw in order to follow the thinking of the author.

If this were the whole story of reading then it is plain to see that, according to this explanation, one could never gain experiences from reading which he had not actually experienced previously. In other words, reading would merely be a device by means of which one recalled from his own experiences those ideas and concepts which the print directed him to recall. However, the fact that the print directs the reader in reconstructing his own experiences allows for the possibility and the probability of causing the reader to combine and recombine aspects of familar experiences in such ways as to cause new vicarious experiences. And, again, new concepts may be gained from reading material if the symbols which represent these concepts are surrounded by an aureole of familiar symbols freighted with meaning for the reader.

It should be remembered also that as life-experiences continue and increase, new concepts are developed and old concepts are reshaped and rebuilt. Gradually, bit by bit, different connotations are added until, after a period of time, the meaning which one reads out of a word is quite different from the meaning gained when the visual symbol was first read.

The process of learning to read, then, is from *meaning* to the *symbol* of the meaning. In adult life, or when a certain degree of reading maturity has been reached, the reverse is true, and the movement is largely from symbol to meaning. This is true, however, only to the extent that the material read is written in symbols the greater portion of which carries specific and known meanings for the reader.

Perhaps one of the mistakes that has been made in the teaching of reading in the upper grades of the elementary school and in high school is that teachers have assumed that the teaching of reading is completed at the end of the primary grades. They have not realized that equipping the pupil with meanings for which the printed symbols stand needs to be done for each specific type of material at all levels of reading maturity when the material carries a vocabulary burden with

which the pupil is not familiar.[1] Since it is obviously impossible to employ actual experiences in order to equip a child with meanings for each word encountered, it would seem that instruction in reading should properly include training in the ability to secure meanings for words and other language patterns with which the pupil is unfamiliar, or familiar in only a limited sense. It should be realized, too, that many of the ideas and concepts gained from reading will remain vague and only partially formed until later experiences which come with greater maturity, will serve to fill in, round out, and properly define the first nebulous understandings.

If the process of learning to read and the condition known as reading readiness are dependent upon such factors as familiarity with the content to be read, related ideas, and vocabulary, then might it not be assumed that there should be provided certain conditions of specific readiness for each different type of material to be read? Since the abilities which constitute reading readiness for a particular type of material operate within the individuals in a fused state, that is, since all these factors are integrated, is it possible to tease out one of the factors in the matrix of these conditions and determine the relation which that single factor bears to the ability to read a specific type of material?

Assumptions Concerning the Relation of Language and Reading

Each of these assumptions is an integral part of the explanations given above relative to the reading process. They are presented here in more or less shortened form since this study is concerned with showing the relation of certain aspects of written language-ability to the ability to read.

1. Reading readiness is assumed to be that condition composed of certain abilities, skills, habits, and attitudes which have developed to such a stage as to give the

[1] Carr, J. W., "The Approach to Reading as a Meaningful Process," *Elementary English Review,* Vol. 13: 146-147, April, 1936. Ayer, Adelaide M., *Some Difficulties in Elementary School History.* Teachers College Contribution to Education, No. 212, 1926.

learner the requisite power to engage in intelligent reading.

2. Reading readiness is not an absolute quality or condition. It, like reading itself, is specific, and for this reason there must be a readiness for materials presenting different types and degrees of difficulty at all stages of an individual's reading growth.

3. Developing an individual to a state of readiness for reading consists of preparing him with the ideas contained in the material to be read, attaching to these ideas both auditory and visual symbols to the end that the individual may develop the ability to think in terms of the ideas presented, and may develop facility in the use of the language in which the ideas are expressed.

4. Since the development of language related to certain specific fields of subject matter is a prerequisite of the ability to read material in those fields, the development of related language power and ability should be kept in advance of reading.

CHAPTER II

Summary of Investigations Pertaining to the Specific Nature of Reading with Particular Reference to History Content and to the Influence of Language Ability upon the Ability to Read

The summaries of these investigations are presented for the purpose of showing the relation of this study to what is already known about the relation of language ability to reading, and for the purpose of showing, also, that several investigators have recommended that the relationship which apparently exists between reading ability and language control be further investigated.

Ayer[1] made a study in which she sought to determine: (1) the extent to which children comprehend the important passages of history content which contain difficult words, terms, and expressions, (2) the extent to which the failure to comprehend such passages in history is due to the difficult words, terms, and expressions, (3) the exact nature of the difficulties which interfere with genuine comprehensions—difficulties essential to history comprehension in general, and difficulties that are not essential to history but which appear in history content as literary adornment, (4) how the ability required to understand passages in history compares with reading comprehension as measured by standardized tests in reading, (5) how children react to history subject matter which they do not fully comprehend, and (6) whether failure to comprehend passages from history is due to wrong grade-placement of the material. The subjects in Ayer's experiment were 1053 pupils from the fifth and seventh grades.

After studying the children's reactions to original selections from history and to simplified selections, Ayer concluded

[1] Ayer, Adelaide M., *Some Difficulties in Elementary School History.* Teachers College Contribution to Education, No. 212, Columbia University, 1926.

that: (1) comprehension is blocked in general by difficulties unessential to history, especially by figurative language and abstract terms, (2) technical vocabulary may be termed essential, but since this is a formidable block to comprehension, teachers should examine carefully the technical terminology and if it is found that such vocabulary is not common to other reading materials which the pupils have already used, the vocabulary should be explained just as historical ideas and theories should be developed, (3) while simplification of history paragraphs can cause children to read the simplification better it does not help them to read the original form—this requires teaching.

Judd and Buswell [2] in their justly famous monograph found that the number of fixations in a line depends upon the kind or nature of the material being read, upon the language difficulties peculiar to the reading matter, upon the purpose held in mind by the reader, and upon the reader's mastery of the mechanics of reading. They found also that such factors as difficulty of language, the type of material being read, and the purpose of the reader controlled or regulated the length of the fixation pause. While the causes listed for regressive movements of the eye in reading are not so conclusive, they point to meaning or language factors. The reasons given for regressive movements of the eyes are:

1. Ineffective return sweeps.
2. Attempts to clarify meaning.
3. Difficulties in arriving at meaning.
4. Lack of word-knowledge.
5. Adjustment to varying language content of varying types of reading material.
6. Change in the purpose of reading.

These conditioning factors in the matter of regressive movements of the eyes in reading, with the possible exception of the first, are matters of language or thought mastery.

[2] Judd, C. H., and Buswell, G. T., *Silent Reading: a Study of the Various Types*, Supplementary Educational Monograph, No. 23, University of Chicago, 1922.

Young says,

> Reading is a complex of language activity and thought-getting. The photographic records (of eye-movements in reading) secured have served to confirm and sustain other experimental data obtained by various techniques that reading is a language problem, a problem of getting and assimilating meaning; that the task of learning to read is not that of acquiring proper eye manipulations but that of learning the language.[3]

Gates [4] lists as the causes of slow reading and improper eye-movements the following:

1. Excessive articulation.
2. Finger following.
3. Inability to use context clues.
4. Special difficulties with thought units, punctuation, etc.
5. Small reading vocabulary.
6. Deficiencies in methods of word perception and word study.

With some few exceptions there are language difficulties.

Russell [5] found from presenting material orally and visually that for pupils of the fifth grade the oral method is superior for learning, for the seventh grade the methods are equal in effectiveness, and for the ninth grade the visual method is superior when the same materials are used in both methods of presentation.

Weede and Gilbert [6] studied vocabulary growth in American history and found that the gain of all pupils from one semester's study averaged about five and one-half words. The average gain represents fourteen per cent of the possible amount of gain, which, when it is taken into consideration that 1050 words are considered important technical words in American history, would mean that it would require seven

[3] Young, W. E., "The Language Approach to Reading," *Elementary English Review*, Vol. 7: 114, May, 1930.

[4] Gates, A. I., *The Improvement of Reading*, Macmillan, New York, 1935, pp. 124-133.

[5] Russell, R. D., "A Comparison of Two Methods of Learning," *Journal of Educational Research*, Vol. 18: 235-238, October, 1928.

[6] Weede, R. O., and Gilbert, L. C., "Vocabulary Growth in American History in the Secondary School," *The School Review*, Vol. 43: 440-445, June, 1935.

semesters' study of American history to equip pupils with the necessary vocabulary. The investigators concluded that there is a definite need for special instruction in the technical vocabulary of American history.

Tormey [7] states that few studies have been made to determine the effect of specific vocabulary-comprehension in one subject upon the specific and general comprehension in other subjects. He assumes that many historical facts involve and, in many cases, hinge upon geographical settings. For this reason, it is believed, the specific comprehension of key geographical words and collocations should be expected to condition the general comprehension of history.

In his conclusions Tormey states that the results of the study indicate that the specific and the general aspects of comprehension of historical content benefit significantly by drill upon certain geographic words and collocations. Further, the results of the study would seem to indicate that teachers should continue to develop the meaning vocabulary of the pupils.

Newburn [8] made a study in order to determine the effect of two methods of vocabulary drill upon achievement in American history. One of the experimental groups was given daily drill on words which were to appear in the assignment to be made that day; another experimental group was given vocabulary drill on words associated with each other (words related to a topic in American history) but which were not to appear in the assignment for the day. The control group had no specific drill except that which was incidental to the teaching of the content and to the discussion. According to the author

> . . . the results indicate the success of teaching what one sets out to teach. If the attention is concentrated on teaching technical vocabulary meanings, the comprehension of these meanings is significantly improved. However, if it is hoped that such teaching will affect the

[7] Tormey, T. J., *The Effect of Drill Upon Specific and General Comprehension in History Content,* University of Iowa Studies in Education, Vol. 9, No. 1, pp. 153-181, 1934.

[8] Newburn, H. K., *The Relative Effect of Two Methods of Vocabulary Drill on Achievement in American History,* Doctor's Thesis in Education, University of Iowa, 1934.

understanding of history, it is not at all certain that the hope will be realized. The teacher is not so much interested in improving the comprehension of technical vocabulary *per se* as he is interested in developing understanding of history. Any drill applied to teaching vocabulary or any other such specific component of history material, can be justified only by its effect upon real history achievement.

The author also found that while the drill methods did serve to develop vocabulary knowledge, in neither of the experimental groups was the achievement in history affected in a positive manner. He indicated that the drills conducted in the two experimental groups were conducted in isolation, i. e., divorced from the specific history content in which the words were later used. He states, also, his belief that true understanding of technical vocabulary undoubtedly affects achievement in history, and that possibly the most effective method of improving achievement through the teaching of vocabulary is to present the items of technical vocabulary at the exact time they are needed.

Newburn suggests that additional experimentation must determine just how drill procedures in specific situations can provide for positive improvement in achievement in history.

The essential weakness of this study as it is reported lies in the lack of information relative to the procedure followed with the control group. This group devoted the same amount of time to teaching, discussion, and the assignment as that consumed by each of the experimental groups in drilling on vocabulary, teaching, discussion, and the assignment. It is quite possible that a great deal of intrinsic vocabulary drill took place during the class periods in the control group.

Nolte [9] conducted an investigation in order to determine the difference between pupils' ability to read simplified material and the ability to read material in its original form.

The study included 1,112 pupils in thirty-two elementary schools in eight city school-systems of Iowa and Illinois. The material used was taken from Test-A, Silent Reading Comprehension of the 1936 Iowa Every-Pupil Testing Program, Grades 6-8. The material comprises paragraph comprehen-

[9] Nolte, K. F., "Simplification of Vocabulary and Comprehension in Reading," *Elementary English Review*, Vol. 14: 119-124, April, 1937.

sion, organization of ideas, grasping and understanding significant details, and comprehension of total meaning. The material selected was rewritten, first, within the limits of the first 2500 words as found in Thorndike's Word Book of Twenty Thousand Words, and was next rewritten so that the vocabulary was kept within the words of the Ogden Basic List. The test questions were presented in both original and simplified forms. A random distribution of pupils was obtained by selecting, for each group, every fourth pupil in the sixth grades of the thirty-two schools. Thus, an average of 278 pupils in each group was obtained.

Each group read one selection in the original form, one selection simplified according to Thorndike's word list, and one selection rewritten according to Ogden's Basic Word List. A fourth group was tested by using simplified test questions to determine the influence, if any, of simplifying test items as well as the reading selections.

The results of the investigation show that no significant differences were found in favor of either method of simplification over the original material. In comparing one technique of simplification with the other, differences in averages in favor of Ogden over Thorndike were very slight. Comparisons between results obtained by the use of simplified and non-simplified tests show all results in favor of the latter.

In addition to the tests referred to above, the investigator selected a cross-section of pupils who had been tested, and tested these pupils again by means of pictorial devices to determine the concepts obtained by these pupils from their reading. These tests were followed immediately by personal interviews to determine further the pupils' understanding of the material read, and to analyze their vocabulary difficulties. The latter type of testing, according to the author, revealed numerous vocabulary difficulties and erroneous concepts which were most frequent among pupils in the lower percentiles. Confusions were found to be caused by certain words and phrases which had several possible connotations.

Nolte concludes that the tendency to simplify vocabulary by the use of a master word-list " based upon mechanical word counts or a list of extremely narrow limits is insufficient in

itself to make material more readable." He suggests that other structural elements affecting reading comprehension must be taken into account. He suggests also that certain concepts are inherently difficult because of the lack of relationship which these concepts have with the experiences of children.

The findings of Nolte would seem to be substantiated by the statement made by Dewey as a result of his study:

> The fact that the words in which any given meaning is expressed are found in well known vocabulary lists is no guarantee that the meaning will be gotten by the children.[10]

In Young's study [11] which included about 1200 pupils of the fourth, fifth, and sixth grades four types of material were presented to the children in four different ways. The material used was: (1) nature-science material, (2) poetry, (3) hero stories, and (4) material related to certain industrial processes. The methods of presentation were: (1) oral reading by the teacher, (2) oral reading by the teacher, plus simultaneous silent reading by the pupils, (3) a single silent reading by the pupils without a definite time-limit, and (4) silent reading by the pupils for a length of time equal to that used in the oral reading presentation.

The procedure of the experiment was so organized as to make it possible for a given class to experience all four types of material presented by the four different methods without duplicating the material within a given class. In order for the investigator to determine the most effective method to use with a given type of material it was necessary to find classes presented with a certain type of material by a certain method excelling on tests the classes which had been presented with similar types of material by other methods. The pupils were tested immediately after the presentation, and some of the tests were repeated a month later to obtain a measure of

[10] Dewey, Joseph C., *A Case Study of Reading Comprehension Difficulties in American History,* Ph. D. Dissertation, University of Iowa, 1931.

[11] Young, W. E., *The Relation of Reading Comprehension and Retention To Hearing Comprehension and Retention,* Ph. D. Dissertation, State University of Iowa, 1930.

delayed recall. According to Young, the tests following immediately seem to indicate that the pupils got slightly more from a teacher-oral presentation and from a teacher-oral presentation plus simultaneous silent reading than from silent reading done independently of teacher-participation, but the difference apparently had disappeared after a month's time. According to this study, in the fourth, fifth, and sixth grades the correlation between reading comprehension and hearing comprehension is very high. In generalizing, it might be said that the pupils who rated low in reading comprehension also rated low in hearing comprehension.

The nature of the experiment was such that the author had no way of determining how much of the material was comprehended by the pupils before they read the material or heard the material read. He admits that the total amount which the pupils obtained from the presentations was not measured exactly by the tests, and that the pupils would have received some score on the tests even if they had not been presented with the material at all. This feature of the experiment, plus the very evident fact that the materials within a single group, poetry, for example, were not of equal difficulty, are two weaknesses of the study.

Young concludes his study by stating that " the data suggest that the language or strongest factor in silent reading constitutes much of the reading problem," and indicates that much of what is assumed to be reading disability is in reality poor language comprehension. Many of the problems incidental to the teaching of reading may be solved if reading is taught on the basis of general language effectiveness. The author also states:

> The certain definite skills peculiar to reading should be acquired, but they should be acquired in thought-getting situations and through language or bodily activities functioning as meaningful responses. Any thought-getting situation or any meaningful language activity does provide training of the best kind for reading; the findings do justify somewhat the implication that in any case of reading disability the first step should be to ascertain the language difficulties of the case.

The chief implication inherent in this investigation would seem to be that specific language facility should be kept ahead

of the demand that pupils read material containing certain language-and thought-forms.

Closely related to Young's study is Durrell and Sullivan's report [12] of their experiences. The authors state that as a result of their experiences at the Educational Clinic, Boston University, in the analysis and correction of reading difficulties with two thousand children over a period of twelve years, a child whose understanding of printed language (reading) does not equal his comprehension of spoken language is deficient in reading. The authors also indicate that difficulties in understanding spoken language may be of two general types: (1) vocabulary, and (2) longer units of speech. They also state that while there are many factors involved in comprehension difficulties, the chief trouble comes from word-meaning and word-recognition, and that

> while much of the trouble in comprehension is cleared up by providing well motivated material of proper reading level and by preliminary word-recognition and word-meaning exercises, some of the children need additional help in comprehension of longer units of material.

These findings would seem to imply quite definitely that language comprehension and language ability are potent factors in the ability to read, and not only should the aural comprehension be used as a standard for reading comprehension, but that the use and aural comprehension of language should be kept in advance of the visual comprehension demanded by reading materials.

Wiedefeld's study [13] is concerned with developing reading-readiness for fourth grade history material. She states that the difficulties involved in reading may be considered in two classes: (1) difficulties incidental to the mechanics of reading, and (2) difficulties involved in the use of reading as a tool in the literature of the various subjects to be read. She found that the tendency of teachers was to separate these difficulties

[12] Durrell, D. D., and Sullivan, Helen B., *Manual of Directions for Durrell-Sullivan Reading Analysis,* Educational Clinic, Boston University, 1937.

[13] Wiedefeld, M. Theresa, *An Experimental Study in Developing History Reading-Readiness with Fourth Grade Children,* Ed. D. Dissertation, Johns Hopkins University, 1937.

and to drill for mastery in each as if one existed without the other. The investigator raised the following questions for study:

1. Can the tool side of reading be separated from what we call the thought side? Can either exist without the other as reading?
2. Does the functioning of reading depend on control of reading techniques, intelligence, familiarity with the content, ideas, vocabulary, and language power to the same extent or in equal degrees?
3. Can one of the elements or activities which operate in fused combination with the others in the process of reading be improved as an independent entity and in turn improve the reading process?
4. To what extent is reading power determined by the demands of the subject matter and the reader's specific readiness for it?

By way of answering these questions, tentative assumptions concerning reading in the special subjects were formulated and used as hypotheses for investigation and experimentation in the field of fourth grade history. The assumptions concerning reading in the special subjects are:

1. Reading is not a general ability which can operate with the same degree of ease and success in all kinds of subject matter.
2. Knowledge of the specific subject treated plays an important part in reading any particular subject matter.
3. Language consciousness involving control of vocabulary, sentence structure, grammatical form, and paragraph construction is an important factor in reading.
4. Reading is reacting. The reader uses the ideas of the written material to shape his own trend of thought. It is a process of reconstructing experience in the light of the written facts and ideas. Reading is like seeing in a mirror a reflection of one's own ideas in the thoughts of another and fusing them so that a product results which is a different thing from either of the originals.
5. Mechanical reading builds ideas which correspond to the word combinations of the author. Thoughtful reading results in ideas which are generated out of such experiences as the individual reader brings to his reading of the printed material. The response a reader makes to any printed matter is different for each individual reading it; it is determined by his own experiences, yet different from them, and different from what the author of the material intended.
6. The abilities necessary to thoughtful reading, exclusive of mechanical skills, are thinking abilities, the same as those used in reacting to any problem. The mental abilities needed for reading are the same as those needed for listening; the same as those used by the blind man who reads with his fingers. Only the mechanism for perceiving the meanings is different.

The author proposed an adaptation in method and curriculum in order to prepare pupils of the fourth grade to read fourth grade history material. The adaptation proposed was in the nature of a period of pre-textbook instruction. The instruction given during the pre-textbook period paralleled in purpose and in procedure the pre-primer period of instruction in first grade reading. Just as the pre-primer teaching consists of three main divisions of emphasis, so did the pre-textbook period of instruction emphasize three major types of experience. Just as the pre-primer instruction is designed to get children ready for a new experience, that of *reading*, so the pre-textbook instruction was designed to get children ready for a new experience, that of *studying* from a textbook.

The three major types of experiences emphasized were:

1. Activities involved in experiencing, reliving, organizing, and thinking the subject matter.
2. Activities involved in expressing the subject matter.
3. Activities involved in reducing the subject matter to reading.

The aims of these three major types of experience were:

1. To develop meaning in the history content and the language in which the history was written.
2. To develop the ability to think and talk in the language of history.
3. To train pupils to think in reading history before attempting to train them to study from a history text.

The experiment involved 1051 fourth grade pupils in Maryland schools, and was continued for seven months during the school year of 1935-1936.

Experimental and control groups were equated on the basis of intelligence, the ability to read history material, and history achievement. The classes in the experimental group, called the Non-Book group in the experiment, were given the pre-textbook instruction. This means that these pupils received the history information largely by combination of an oral and visual method, i. e., story-telling on the part of the teacher, through the use of pictures, dramatizations, sand-table representations, excursions, and other means which would serve to present the material vividly, and which at the same time would serve to develop meanings inherent in the language of history.

In addition to the activities which were designed to give information to children there were activities which provided opportunities for the children to express the ideas which had been presented. These activities included: telling the story in answer to the teacher's questions, telling the story in the pupils' own language, telling the story in the language of history, dramatizing and pantomiming appropriate portions of the content, illustrating phases of history in poster form, by drawing, making silhouettes, and friezes, and participating in vocabulary exercises to the end that the pupils might learn to use the language of history and to think with this language.

The third major type of activity was concerned largely with developing the ability to read the history material which the children could understand and which they could express. The ability was developed by using blackboard reading-units in which the main parts of the history stories were used and in which the language of history was incorporated wherever possible. These were cooperative units, developed from the children, dictated by them, and written by the teacher. These cooperative stories were supplemented by re-writes which gave the same ideas in several different forms, employing changes and re-changes in the vocabulary. Written assignments were given which called for several types of interpretation of the ideas, and which required the pupils to read and to write the language of history.

While the experimental group was being given the type of instruction outlined above, the control group was being taught history by the traditional method of studying the text and discussing the ideas gained through reading.

As a result of the data accumulated during the investigation the author made the following conclusions:

1. The majority of pupils in the fourth grade gain in ability to read history and in knowledge of history regardless of the method by which they are taught.
2. Ability to read history can be improved by making the pupils articulate in the subject matter.
3. Reading ability is not a general but a specific ability and its effectiveness depends in part upon the reader's familiarity with the ideas expressed in the reading material.
4. The pupils of low ability profit most from a period of pre-textbook instruction.

5. Reading ability is determined in large part by the mental maturity of the reader.
6. In so far as the various activities were kept in integrated form, it is difficult to know just what was most responsible for the growth in ability to read history material. The pupils of the Non-Book Group made no significant gains in knowledge of history over the pupils of the Book Group (control group) when measured by the history-fact test, yet the classroom improvement of the low ability children of the Non-Book Group was much more marked than that of the low ability children of the Book Group, most of whom took no part in the history discussions and many of whom were not able to pay attention to the discussions of the other children.
7. The improvement in the participation of the low ability pupils of the Non-Book Group, which seems to have been the basis for the improvement in reading history, was evidenced by an awakened interest in the subject, a desire to participate in the activities of history instruction, and marked improvement in the ability to express themselves.
8. It would seem reasonable to believe that the growth in language ability, which at the same time indicated a growth in control of facts and a growth in ability to understand the history material, played a large part in the improvement in reading history.
9. The growth in language ability was not measured objectively; therefore there are no data to substantiate this belief. The experiment is incomplete without some data to indicate the relationship existing between language power and ability to read.
10. An experiment which attempts to improve reading power in any specific subject by developing the specific vocabulary and the children's ability to express the ideas of the subject, and which measures the growth in such language power will help to determine more surely the specific contributions of the pre-textbook instruction used in this experiment.

Gray and Holmes [14] conducted an experiment with fourth grade pupils " to determine whether pupils are able to recognize their deficiencies and needs in respect to the meanings of words " and to determine " the relative merit of incidental and direct methods of developing and expanding meanings of words in the field of history." *

[14] Gray, W. S., and Holmes, Eleanor, *The Development of Meaning Vocabularies in Reading.* Publications of the Laboratory Schools of the University of Chicago, No. 6, February, 1938. University of Chicago, Chicago, Illinois.

* The investigation reported by Gray and Holmes was published *after* this study had been completed.

CHAPTER III

The Experiment

Practically all the studies examined indicate that children experience difficulty in reading and comprehending history. They indicate, also, that the factors which block the aural and visual comprehension of history material are conditions which may be classified largely as language difficulties. Some of the studies give evidence of specific attempts to provide children with the specific vocabulary necessary for history comprehension. Others merely cite the need for additional investigation of the relation of language-power and history-reading comprehension.

The next logical step following upon the expression of this practical need was to attempt to improve the reading of history material by developing facility in the use of the language of history. The problem, therefore, was to develop a readiness for reading history through the development of history language in various types of experiences which are pertinent to the teaching and the learning of history.

The Subjects of the Experiment

For the purpose of this experiment five sixth-grade classes in the schools of Talbot County, Maryland, were selected. The experimental procedure covered a period extending from November, 1936, to May, 1937. From February to May, 1937, two groups of pupils within the original experiment were studied after they had been equated on factors which were different from those factors used as the basis of equating the original groups.

The Experimental Variable

The essential variable factor in this experiment was the emphasis placed upon the development of the language of history to the end that it could be used accurately, clearly, and meaningfully in oral and written form by the pupils. This

emphasis was characteristic of the teaching method employed by the teachers of the experimental classes as one means of providing a condition of readiness for the reading of history content. With the same material being covered by all classes in the experiment, the difference between the conduct of the classes in the experimental group and the classes in the control group was one of method. This difference between the teaching procedures of the two groups lay in the use of teaching techniques designed to cultivate an active, specific vocabulary in history in the experimental group while no such pointed efforts were employed by the teachers of the children in the control group.

The method or teaching procedure used by the teachers of the experimental group might be described, briefly, as follows:

1. An over-view of new material to be presented by the teacher orally with the use of pictures, maps, diagrams, blackboard sketches, and other graphic and visual aids.
2. During this over-view the teacher emphasized key-words and phrases and technical vocabulary by writing them on the board, explaining their meaning, pronouncing them, and having the children read them.
3. During the over-view the teacher paused occasionally in order that the pupils might take notes on the material covered.
4. Following the original presentation, the pupils organized their notes and expanded them into summary paragraphs.
5. These notes were used as the basis of subsequent class discussions.
6. Drill devices were employed in teaching the basic vocabulary:
   a. questions were asked by the teacher; by the pupils
   b. matching devices were used
   c. blanks were filled with key-words and phrases
   d. sentences showing the meaning of key-words were written
7. Material from the grade-text was read with large questions or an outline as a guide to the reading.

8. Class discussions based on the detailed material of the text-books were conducted. During these discussions the use of exact history vocabulary and general correctness, clarity, and maturity of expression were emphasized.
9. The original notes taken by the pupils were expanded into paragraph form, employing greater detail than that used in the summary paragraphs written immediately after the notes were taken.
10. Vocabulary lists were kept posted in the classroom and were used frequently for various games and drills.

The method of teaching used by the teachers of the control classes included the following:

1. Old material, i. e., familiar material was recalled and reviewed orally.
2. Study-guides, including questions and outlines, were presented and explained by the teacher.
3. Under supervision the children read the material called for by the study-guides.
4. Class discussions followed the reading.
5. Summary outlines were developed on the board either as the discussion proceeded or at the close of the class discussion.
6. The summary outlines were copied in notebooks and used by the pupils as the basis of subsequent recall and review.

Control of Non-Experimental Variables

The pupils included in the experiment were typical of the pupils in the school system as a whole. They came from small country towns, from farms, and from watering communities. No locality or school represented in the experiment was superior or inferior to any other as judged by ordinary standards. The schools represented in the study were graded schools of four or five teachers. The teachers of the classes were all graduates of Maryland State normal schools. Their years of teaching experience ranged from three to six years.

All teachers had had the same type of supervision for the entire period of their teaching experience. The teachers of the control classes were assumed to be equal in teaching ability to the teachers of the experimental classes. The same course of study, the same textual materials, and other aids to teaching were available to all teachers. Each class in the experiment was taught history for the same length of time each day during the period of the experiment. All classes received the same amount and types of supervision during the experiment.

Tests

The tests used in the experiment were a test of mental ability, a test of history achievement, a test in general reading, a test of history reading, and tests to determine the history-language ability of the pupils.

The test of mental ability used was the Otis Self-Administering Test of Mental Ability, Intermediate, Form A.[1] This test has had wide use and is highly standardized. The norms were derived from scores of about 120,000 pupils, from median scores of several grade groups in relation to the median ages of these grade groups, from correlations between scores in the Higher and Intermediate Examinations and mental ages by the Herring Revision of the Binet-Simon Tests, and correspondence between the Intermediate and Higher Examinations themselves.

The coefficient of correlation between forms A and B of the Intermediate Examination is $.948 \pm .006$.

The test used to measure knowledge of history was the Renfrow Sixth Grade History Test, Tests I and II, Form A.[2] These tests are designed to cover the entire field of sixth grade history as taught in the Maryland schools. They consist of one hundred twenty multiple-choice statements which cover the range of history represented by the following countries and topics: Egypt, Babylonia, Phoenicia, Judea,

[1] Otis, Arthur S., *Otis Self-Administering Test of Mental Ability, Intermediate Examination, Form A.* World Book Co., Yonkers-on-Hudson, New York, 1922.

[2] Renfrow, O. W., *Renfrow Sixth Grade History Test.* C. A. Gregory Co., Cincinnati. Ohio, 1930.

Persia, Greece, Rome, Carthage, the German Invasion and Conquest of Europe and England, the Feudal Period, the Circumstances Leading up to the Discovery of America, and the European Struggle for Leadership in the New World. The tests are informational in nature, but the author states that he "believes that the successful completion of the tests requires a great amount of reasoning as well as knowledge of the European background of American history." The coefficient of reliability of the tests is .90 ± .01. The author asserts that "the tests compare favorably with the teachers' judgment of the pupils' accomplishment in history, and that there is also a high correlation between this test and the Otis Intelligence Test." These statements are based on 2454 pupils' scores.

The *reading* section of the Unit Scales of Attainment, Division 2, Form A,[3] was used to measure general reading ability. This test consists of nine paragraphs selected from history, geography, literature, and science materials. Each paragraph is accompanied by from four to six multiple-choice statements. Each statement is followed by five "choices." The test measures ability to read for facts, to select the central idea of a paragraph, and ability to interpret material rather than to reproduce the meaning expressed literally.

No satisfactory, commercially published test of reading in Old World Background history was available. The test employed for this purpose, therefore, was one known as the Anne Arundel History Reading Test. This test was constructed in 1935 by a committee of school people of the Maryland public schools. The committee consisted of the State Supervisor of Elementary Schools, a county superintendent, two elementary school supervisors, two high school principals, and one elementary principal.

The test consists of four parts: (1) Reading Rate, (2) Fact and Vocabulary, (3) Story Comprehension, and (4) Paragraph Comprehension. In this study only the two latter parts were used. The Story Comprehension phase of the test consists of eight connected paragraphs relative to Aegean

[3] *Unit Scales of Attainment, Division 2, Form A.* Educational Test Bureau, Inc., Minneapolis, Minnesota.

civilization and the Sea-Kings of Crete, followed by seventeen multiple-choice statements. Under each statement are four "choices." The Paragraph Comprehension section of the test consists of eight paragraphs of history material, selected with the view that various types of history material would be represented in the test. The paragraphs are, therefore, fairly representative of what might be termed the scientific aspect of history, social history, biography, descriptive history, military history, artistic and cultural history, and the political element in history. Each of the eight paragraphs is followed by from three to four questions, multiple-choice statements, or directions. These measure the ability to reproduce factual material, to perceive similarities between ideas expressed differently, to detect cause and effect relationships, and to select the central idea from a group of ideas. In 1935 the test was given to 1300 pupils in Anne Arundel and Talbot counties, Maryland. The reliability coefficient, corrected by the Spearman-Brown formula, was found to be .826 ± .014.

Since there was no standardized test available for use in measuring history-language ability in written composition, the writer constructed a test to serve the purpose. The aim, originally, was to give the pupils groups of related facts, and to require the pupils to use these facts in reacting to questions. The object was to preclude the necessity of knowledge of history on the part of the pupils, but to require them to *reason* with the facts supplied. In this way, it was believed, a measure of their language power, could be obtained. Language power was interpreted as including the thought-patterns expressed, the vocabulary, and the meaningfulness of the response.

However, it was found to be impossible to weight the responses accurately or to measure them on a scale of composition values. Some of the shorter responses were as well expressed and as accurate as longer ones, and yet it seemed that since in the longer and more involved responses the pupils' opportunity for making greater use of vocabulary was increased, the weight of the longer responses should accordingly be greater. Therefore, because of the great amount of

subjectivity involved in scoring or grading the responses, it was decided to abandon this method of measuring the pupils' history-language ability.

Further efforts to construct a test of history-language ability resulted in a test which proved to be satisfactory. Sets of statements, relative to the history material covered by the sixth grade, and pictures accompanied by statements were presented to the children. The statements were presented orally so that reading was not required on the part of the pupils. Each set of statements was followed by a question, given orally and in writing on the board at the same time. The pupils wrote the answers to the questions. The aim was to secure relatively free expression in history content.[4]

The written responses of the pupils were analyzed for history vocabulary by checking the words used by the pupils against the vocabulary of four widely used sixth-grade texts in Old World Background history.[5] One of the texts was in use as a basal text in all the classes represented in the experiment. The others were in use as supplementary texts in all the teaching centers.

In order to secure a more refined measure of the children's ability to use history vocabulary in written expression another test was devised by the writer. The statements used by the examiner in the test of history-vocabulary in written composition, described above, were analyzed for history words and phrases. These were presented one at a time to the children both orally and in written form on the blackboard.

The pupils were asked to make sentences that would show the meaning of the words and phrases. However, while many of the statements made were perfect in form and factually

[4] A copy of this test is included in the Appendix of the original manuscript to be found in the Library of the Johns Hopkins University.

[5] Vollintine, Grace., *American People and Their Old World Ancestors.* Ginn and Company, New York.

Halleck, R. P., and Frantz, J., *Our Nation's Heritage.* American Book Company, New York.

Hall, Jennie, *Our Ancestors in Europe.* Silver, Burdett and Company, New York.

Kelty, Mary G., *How Our Civilization Began.* Ginn and Company, New York.

true, they were not constructed in such a manner as to prove that the pupils really knew the *meanings* of the words which they were using. For example, a pupil might write, "*Trading stations* are places where people trade," in order to show the correct use and meaning of the underscored term. It is evident, however, that the sentence does not clearly show the meaning of *trading stations*. "*Trading stations* are places where people exchange goods," serves to indicate in a clearer manner the pupil's understanding of the term *trading stations*. In the latter sentence by the use of the words "goods" and "exchange" the pupil has made clear his grasp of the concept.

Therefore, it was decided to give the words again to children, after certain practice exercises were used, and have the pupils complete sentences so that the parts written by them as the second parts of the incomplete sentences would show that they understood the meanings of the key-words and phrases used in the first part of the sentences. By this means greater control was employed and the pupils were not so free to give glibly sentences which they could write from memory but which did not show conclusively that the meanings of the key-words were understood.[6]

The preliminary work on this test was done with pupils not included in the experiment. The test was not completed until January, 1937, and consequently was not used in testing and equating the groups originally. The coefficient of reliability based on the scores of 186 children tested in February, computed by correlating the odd and even scores and applying the formula $\frac{2r}{1+r}$ was .875 ± .016.

Administering the Tests

All tests were administered by the writer. The papers were scored and checked by teachers under the supervision of the writer. Early in November, 1936, the Otis Self-Administering Test of Mental Ability, Intermediate, Form A, the Anne

[6] A copy of this test is included in the Appendix of the original manuscript to be found in the Library of the Johns Hopkins University.

Arundel Test in History Reading, the History Composition-Vocabulary Test, the Renfrow History Achievement, Test I and II, Form A, and the Unit Scales of Attainment, Reading, Division 2, Form A were given. The test measuring the use of history vocabulary in completion sentences was not given until February, 1937.

Equating Groups

Because of the complexity of the human organism, absolute equality of two groups of pupils in all phases of mental and physical development is practically impossible unless unusually large groups are used. The objective in selecting groups of subjects for an experiment is to secure subjects as nearly equal as possible in all phases of development and as nearly equal as possible in their potentialities for growth, so that when the experimental variable is applied the experimenter can be reasonably satisfied that changes produced in the group have been produced by the experimental variable and not by any other factor.

McCall [7] suggests that equating may be done by chance, i. e., by selecting the subjects at random. Equivalence by this method may be secured, however, only when the number of subjects is extremely large, and for this reason it is seldom used in educational experimentation.

Groups of subjects may also be equated by pairing. When this technique is employed the object is to secure for one group subjects which match, individual for individual, the subjects in another group in certain observable traits.

Some experimenters hold that the best measure of future growth in an experimental trait is the current rate of growth. They, therefore, proceed to test the rate of growth in the experimental variable at intervals preceding the actual experiment in order to determine the rate at which each subject is developing in the trait being observed. After this has been determined it is possible to pair the subjects on this basis.

[7] McCall, W. A., *How to Experiment in Education.* Macmillan, New York, 1923, pp. 41-42.

Groups may also be equated by securing for each group comparable measures of central tendency and dispersion for each of the bases on which the groups are to be equated. For example, equating groups on the basis of the comparability of the means and standard deviations of the distributions is an accepted procedure for equating groups in educational experimentation and research.

Whenever possible groups should be equated on as many bases as can be conveniently handled because of the intricate interdependence of the bases. It would seem reasonable to insist that when subjects are being equated for the purpose of determining the effect of an experimental variable that the groups should be equated on the bases of all factors which may have influence upon the variable.

The results of the tests measuring mental ability, ability to read history, and ability to use history vocabulary in written composition were used for equating two groups of pupils for the purpose of comparing the results of the development of the ability to use history language.

In this study the first step in equating the groups was to find the means and the standard deviations of the distributions of the test results used as the bases for securing comparable groups. Next, cases were drawn first from one group and then from the other and new calculations of the means and standard deviations were made until the means of the two selected groups were practically equal, i. e., with not so much as a whole number of difference between them, and the standard deviations were kept fairly equal.

The mean was selected as the measure of central tendency because it is simple, concrete, easily calculated, and is stable in that it is little affected by fluctuations of sampling. However, since the means of the distributions indicated only the typical size or average of the variables, additional information relative to the nature of the variable was necessary. In order to gain a clearer picture of the distributions of which the means had been obtained, the standard deviation, a statistical device for measuring variability or spread, was used. The standard deviation as a measure of dispersion has certain

advantages. It is calculated with comparative ease, is rigidly defined, and is relatively stable. In a normal distribution the standard deviation when measured off above and below the

TABLE I

FREQUENCY DISTRIBUTIONS OF MENTAL AGE SCORES FOR TWO ORIGINAL UNEQUATED GROUPS OF SIXTH GRADE PUPILS: FROM WHICH THE EQUATED GROUPS WERE DRAWN IN NOVEMBER

Mental Age	Experimental	Control
200-204	1	0
195-199	2	0
190-194	0	0
185-189	1	1
180-184	3	1
175-179	0	0
170-174	2	3
165-169	6	5
160-164	4	4
155-159	6	8
150-154	7	9
145-149	12	10
140-144	6	7
135-139	11	11
130-134	7	13
125-129	6	4
120-124	7	7
115-119	5	5
110-114	3	3
105-109	2	2
100-104	0	0
95-99	1	0
90-94	1	0
N	93	93
Mean	144.4 ± 1.48	142.1 ± 1.25
S. D.	21.2 ± 1.05	17.8 ± .85

mean marks off the limits of the middle 68.26% of the distribution.

Therefore, by equating the groups so that for each separate test the means of the results were practically the same for each group, and the standard deviations were comparable, it was assured that not only were the central tendencies of the

groups the same, but, at the same time, the middle two-thirds, roughly speaking, of the groups were comparable.

Tables I and II, respectively, give the distributions of the results of tests measuring Mental Age, History Reading Ability, and the ability to use History Vocabulary in Compo-

TABLE II

FREQUENCY DISTRIBUTIONS OF SCORES IN TESTS MEASURING ABILITY TO READ HISTORY AND ABILITY TO USE HISTORY VOCABULARY IN COMPOSITION FOR TWO ORIGINAL UNEQUATED GROUPS OF SIXTH GRADE PUPILS FROM WHICH THE EQUATED GROUPS WERE DRAWN IN NOVEMBER.

Scores	Experimental		Control	
	Reading History	Voc. in Composition	Reading History	Voc. in Composition
40-44	0	0	1	0
35-39	1	3	1	3
30-34	7	5	4	5
25-29	17	16	8	16
20-24	25	36	25	35
15-19	32	22	29	20
10-14	7	8	21	7
5-9	4	3	4	7
N	93	93	93	93
Mean	21.21	21.85	19.27	21.42
P. E.	.44	.43	.45	.47
S. D.	6.3	6.1	6.5	6.7
P. E.	.31	.30	.31	.33

sition for the original groups from which the equated groups were drawn. These tables are found on pages 28 and 29.

Table I-A, page 30, gives the Mental Age distributions: Table II-A, page 31, gives the initial scores in History Reading and in History Vocabulary in Composition; Table III, page 32, gives a summary of the initial status of the two groups. Of the 186 original subjects, seven were lost in equating.

In February, two groups of pupils within the original experiment were equated on the basis of mental age, the ability to read history, and the ability to use history vocabulary in

TABLE I-A

FREQUENCY DISTRIBUTION OF MENTAL AGE FOR TWO MATCHED GROUPS OF SIXTH GRADE CHILDREN, EXPERIMENTAL AND CONTROL GROUPS

Mental Age	Experimental	Control
185-189	0	1
180-184	3	1
175-179	0	0
170-174	2	3
165-169	6	5
160-164	4	4
155-159	6	8
150-154	7	9
145-149	12	10
140-144	6	6
135-139	11	11
130-134	6	12
125-129	6	4
120-124	7	7
115-119	5	5
110-114	3	3
105-109	2	2
100-104	0	0
95-99	1	0
90-94	1	0
N	88	91
Mean	141.4 ± 1.37	142.2 ± 1.22
S. D.	19.0 ± .96	17.3 ± .86

completion sentences. These last scores were February scores. Due to the equating, 16 pupils were lost. Therefore, while the groups equated in November contained 179 children, the two groups equated within these groups contained only 163 children.

TABLE II-A

FREQUENCY DISTRIBUTIONS OF INITIAL SCORES IN TESTS MEASURING ABILITY TO READ HISTORY AND ABILITY TO USE HISTORY VOCABULARY IN COMPOSITION FOR EXPERIMENTAL AND CONTROL GROUPS.

	Experimental		Control	
	Reading History	Voc. in Composition	Reading History	Voc. in Composition
40-44	0	0	1	0
35-39	0	3	1	3
30-34	3	3	4	5
25-29	17	14	8	16
20-24	25	35	25	33
15-19	32	22	29	20
10-14	7	8	21	7
5-9	4	3	2	7
N	88	88	91	91
Mean	20.51	21.48	19.53	21.40
P. E.	.40	.43	.45	.48
S. D.	5.6	6.0	6.5	6.8
P. E.	.28	.30	.31	.34

TABLE III

SUMMARY OF INITIAL STATUS OF TWO GROUPS OF SIXTH GRADE PUPILS EQUATED ON THE BASIS OF MENTAL AGE, NOVEMBER SCORES IN TESTS MEASURING ABILITY TO READ HISTORY AND ABILITY TO USE HISTORY VOCABULARY IN COMPOSITION

Group	No. of Cases	Mental Age				November Scores							
						History Reading				History Vocabulary			
		Mean	P. E.	S. D.	P. E.	Mean	P. E.	S. D.	P. E.	Mean	P. E.	S. D.	P. E.
Experimental	88	141.42	1.37	19.0	.96	20.51	.40	5.6	.28	21.48	.43	6.0	.30
Control	91	142.28	1.22	17.3	.86	19.53	.45	6.3	.31	21.40	.48	6.8	.34

CHAPTER IV

Results for Total Groups

(Originally Equated Groups)

After a period of thirteen weeks, continuing from November to February, all classes in the experiment were retested. The final tests were administered after another period of thirteen weeks which ended in May. The same tests, with the exception of the intelligence test, were used as those administered in the November testing.

The distributions of scores of the November, February, and May tests in History Reading for the two equated groups are given in Table IV, page 35.

The summary of the results is given in Table V, page 36.

The distributions of scores of the November, February, and May tests in the use of History Vocabulary in Composition for the two equated groups are given in Table VI, page 37.

The summary of the results is given in Table VII, page 38.

When two groups of subjects are being compared on the basis of growth made in certain traits, abilities, or knowledges, as measured by test results, it is customary to present the difference between the gains and to state whether or not the difference is significant. "Significance" used in this sense is determined by the size of the measure in relation to the size of its probable error. The probable error of a measure marks off the amount by which the obtained measure may differ from the true measure which would result if an infinite number of cases were observed. 1 P. E. includes fifty per cent of the cases in a normal curve of distribution. The ratio between a measure and its probable error is called the "critical ratio," and since 4 P. E.'s mark the practical limits of a normal curve of a distribution, a critical ratio of at least 4. must be obtained in order for a value to be considered statistically significant.

Lincoln [1] points out that the use and interpretation of the probable error of a difference is based on the assumption that the data for which the probable error is calculated represent a random sample of the whole population for which the generalization is being attempted. He states, also, that research students should question the practical significance of a difference, once the statistical significance has been determined, by studying the overlapping of groups.

A comparison of the means and the standard deviations of comparable groups will reveal the degree of overlapping. It is possible that statistically significant differences between means may be overcome from a practical point of view by individual differences within the groups being compared.

During the first period of the experiment both groups made gains in reading history. The pupils in the experimental group who had had a high degree of emphasis placed on the ability to use history vocabulary meaningfully gained more than the control group. The difference, $1.95 \pm .55$, is small and with a critical ratio of 3.5, the difference is not significant statistically.

From November to May the experimental group and the control group both made significant gains in history reading. During this period the experimental group gained $3.95 \pm .56$ in excess of the gain made by the control group. Since the difference in gain for this period has a critical ratio of 7., the gain is statistically significant.

The summary of the results of tests measuring ability to read history given in Table V shows only the means and the standard deviations of the distributions. Graph I, page 39, presents the detailed results of the three testings in cumulative percentages. The graph shows the percentile rank of the experimental and control groups for November, February, and May. The graph is presented in order that the differences between the amount and character of growth for the two groups might be shown more clearly.

[1] Lincoln, E. A., "The Insignificance of Significant Differences" *Journal of Experimental Education*, Vol. II, No. 3, March, 1934, pp. 288-290.

A study of the cumulative percentages discloses the changes in all levels of test difficulty. In November, for example, 96.5% of the experimental group and 93.4% of the control group made scores less than 30. In February the experimental had 59.0% of its members making scores less than 30, while the control group had 80.2% of its members with scores less than 30. This is a difference of 21 in favor of the experi-

TABLE IV

FREQUENCY DISTRIBUTIONS OF SCORES IN TESTS MEASURING ABILITY TO READ HISTORY FOR TOTAL EXPERIMENTAL AND CONTROL GROUPS IN NOVEMBER, FEBRUARY, AND MAY

	Experimental			Control		
	Nov.	Feb.	May	Nov.	Feb.	May
45-49	0	0	4	0	0	1
40-44	0	11	10	1	3	2
35-39	0	17	22	1	6	6
30-34	3	8	17	4	9	19
25-29	17	21	21	8	28	30
20-24	25	17	7	25	27	21
15-19	32	11	5	29	15	11
10-14	7	2	2	21	2	0
5-9	4	1	0	2	1	1
N	88	88	88	91	91	91
Mean	20.51	28.9	32.2	19.53	25.4	27.1
P. E.	.40	.62	.57	.45	.47	.46
S. D.	5.6	8.6	7.9	6.3	6.7	6.5
P. E.	.28	.43	.40	.31	.33	.32

mental group. In May the experimental group had 39.7% of its members making scores less than 30, while the control group had 69.2% of its members making scores below the same point. This is a difference of 29.5 in favor of the experimental group. For the period of the whole experiment the experimental group dropped from 96.5% to 39.7% with scores less than 30, while the control group dropped from 93.4% to 69.2% with scores less than 30. The total difference, therefore, in favor of the experimental group is 32.6.

TABLE V

SUMMARY OF RESULTS OF TESTS MEASURING ABILITY TO READ HISTORY FOR TOTAL EXPERIMENTAL AND CONTROL GROUPS

Group	No. of Cases	Scores in Reading History November Mean	P. E.	S. D.	P. E.	February Mean	P. E.	S. D.	P. E.
Experimental	88	20.51	.40	5.6	.28	28.97	.62	8.63	.43
Control	91	19.53	.45	6.3	.31	25.46	.47	6.75	.33

Group	No. of Cases	Scores in Reading History May Mean	P. E.	S. D.	P. E.
Experimental	88	32.27	.57	7.9	.40
Control	91	27.17	.46	6.5	.32

Gains in Reading History

Group	No. of Cases	Gain Nov. to Feb. Mean	P. E.	S. D.	P. E.	Gain Nov. to May Mean	P. E.	S. D.	P. E.
Experimental	88	8.46	.38	5.4	.27	12.10	.42	5.8	.29
Control	91	6.51	.39	5.6	.27	8.15	.38	5.4	.26
Difference in Favor of Experimental Group		1.95	.55			3.95	.56		

The coefficient of correlation between the November and May results of tests measuring ability to read history was .539 ± .051 for the experimental group; .631 ± .42 for the control group.

By referring to Table VII, page 38, it will be seen that during the first period of the experiment both groups made gains in the ability to use history vocabulary in composition. The children in the experimental group gained more in this ability than did the control group. The gain from November to February was 2.44 ± .46 and, since the critical ratio is 5.1, the gain is statistically significant.

TABLE VI

FREQUENCY DISTRIBUTIONS OF SCORES IN TESTS MEASURING ABILITY TO USE HISTORY VOCABULARY IN COMPOSITION FOR TOTAL EXPERIMENTAL AND CONTROL GROUPS IN NOVEMBER, FEBRUARY, AND MAY

	Experimental			Control		
	Nov.	Feb.	May	Nov.	Feb.	May
50-54	0	0	2	0	0	1
45-49	0	3	8	0	1	4
40-44	0	16	19	0	4	13
35-39	3	17	17	3	14	8
30-34	3	17	18	5	13	20
25-29	14	13	10	16	27	18
20-24	35	14	9	33	21	20
15-19	22	7	5	20	8	5
10-14	8	1	0	7	3	2
5-9	3	0	0	7	0	0
N	88	88	88	91	91	91
Mean	21.48	32.0	35.0	21.40	28.1	30.7
P. E.	.43	.61	.62	.48	.52	.61
S. D.	6.0	8.5	8.6	6.8	7.4	8.7
P. E.	.30	.43	.44	.34	.36	.43

From November to May both the experimental and control groups made significant gains in ability to use history vocabulary in composition. The gain from November to May was greater than the gain from November to February in both cases. The experimental gained 3.48 ± .53 in excess of the gain made by the control group during this period. Since the critical ratio of the difference is 6.5, the difference in favor of the experimental group is significant.

Since the summary of the results of the tests measuring ability to use history vocabulary in composition, presented in Table VII, shows only the means and the standard deviations of the distributions, Graph II, revealing the detailed results

TABLE VII

SUMMARY OF RESULTS OF TESTS MEASURING ABILITY TO USE HISTORY VOCABULARY IN COMPOSITION FOR TOTAL EXPERIMENTAL AND CONTROL GROUPS

Group	No. of Cases	Scores in Use of History Vocabulary in Composition: November Mean	November P. E.	November S. D.	November P. E.	February Mean	February P. E.	February S. D.	February P. E.
Experimental	88	21.48	.43	6.0	.30	32.04	.61	8.5	.43
Control	91	21.40	.48	6.8	.34	28.10	.52	7.4	.36

Group	No. of Cases	May Mean	May P. E.	May S. D.	May P. E.
Experimental	88	35.00	.62	8.6	.44
Control	91	30.79	.61	8.7	.43

GAINS IN HISTORY VOCABULARY USAGE IN COMPOSITION

Group	No. of Cases	Gain Nov. to Feb. Mean	Gain Nov. to Feb. P. E.	Gain Nov. to Feb. S. D.	Gain Nov. to Feb. P. E.	Gain Nov. to May Mean	Gain Nov. to May P. E.	Gain Nov. to May S. D.	Gain Nov. to May P. E.
Experimental	88	10.00	.37	5.2	.26	13.35	.42	5.84	.29
Control	91	7.55	.26	3.7	.18	9.86	.33	4.71	.23
Difference in Favor of Experimental Group		2.44	.46			3.48	.53		

The coefficient of correlation between the November and May results of tests measuring ability to use history vocabulary in composition was .730 ± .033 for the experimental group; .724 ± .033 for the control group.

of the three testings in cumulative percentages is given on page 39. The percentile ranks of the experimental and control groups for November, February, and May are shown.

GRAPH I

CUMULATIVE PERCENTAGE OF CHILDREN OF THE TOTAL GROUPS AT THE VARIOUS SCORE LEVELS IN HISTORY READING: NOVEMBER, FEBRUARY, AND MAY

Score	Experimental			Control		
	Nov.	Feb.	May	Nov.	Feb.	May
Under 50			100			100
Under 45		100	95.4	100	100	98.9
Under 40		87.5	84.0	98.9	96.7	96.7
Under 35	100	68.1	59.0	97.8	90.1	90.1
Under 30	96.5	59.0	39.7	93.4	80.2	69.2
Under 25	77.2	35.2	15.9	84.6	49.4	36.2
Under 20	48.8	15.9	7.9	57.1	19.8	13.1
Under 15	12.5	3.4	2.3	25.3	3.3	1.1
Under 10	4.5	1.1	0.	2.2	1.1	1.1
Medians	20.2	26.25	32.65	18.9	25.9	27.1

GRAPH II

CUMULATIVE PERCENTAGE OF CHILDREN OF THE TOTAL GROUPS AT THE VARIOUS SCORE LEVELS IN HISTORY VOCABULARY IN COMPOSITION: NOVEMBER, FEBRUARY, AND MAY

Score	Experimental			Control		
	Nov.	Feb.	May	Nov.	Feb.	May
Under 55			100			100
Under 50		100	97.7		100	98.9
Under 45		96.5	88.6		98.9	94.5
Under 40	100	78.4	67.0	100	94.5	80.2
Under 35	96.5	59.0	47.7	96.7	79.1	71.5
Under 30	93.1	39.8	27.3	91.2	64.8	49.5
Under 25	77.2	25.0	15.9	73.6	35.2	29.7
Under 20	37.5	9.1	5.7	37.4	12.1	7.7
Under 15	12.5	1.1	0	15.4	3.3	2.2
Under 10	3.4	0	0	7.7	0	0
Medians	15.8	27.2	30.2	16.5	22.8	25.5

A study of the cumulative percentages discloses the changes in all levels of test difficulty. In November, for example, 93.1% of the experimental group and 91.2% of the control group made scores less than 30. In February the experimental group had 39.8% of its members making scores less than 30, while the control group had 64.8% of its members with scores less than 30. This is a difference of 25 in favor of the experimental group. In May the experimental group had 27.3% of its members making scores less than 30, while the control group had 49.5% of its members with scores below the same point. This is a difference of 22 in favor of the experimental group. For the period of the whole experiment the experimental group dropped from 93.1% to 27.3% with scores less than 30, while the control group dropped from 91.2% to 49.5% with scores less than 30. The total difference, therefore, in favor of the experimental group for those with scores under 30 is 24.1.

It has been shown, then, that the growths made by the experimental group for the entire period of the experiment in History Reading and in ability to use History Vocabulary in Composition are statistically significant.

Correlations

Correlations are submitted as additional evidence to supplement the findings previously presented. The coefficient of correlation shows a tendency toward concomitant variation. The presence of correlation between two variables does not, however, prove any causal relation between them. When two variables are compared and show evidence of correlation this relationship may be due to the effect of a third factor to which they are both related, or the relationship may exist because within each of the variables there are certain elements which are causally related.

In this study it seemed necessary to determine the relationship between growth in history reading and growth in ability to use history vocabulary in composition for the period of the entire experiment, and the relationship between history reading and ability to use history vocabulary in completion

sentences for the latter half of the experiment. Because of the possibility that the degree of relationship between the two variables, history reading and history vocabulary, was dependent upon other contributing factors which may have influenced the variables individually or in common, the technique of partial correlation was introduced. The aim was to determine the true relationship between the two variables when the influence of other variables, such as intelligence and history achievement, had been held constant or had been eliminated.

Since the statistical quantities used in this chapter are based on samples, the results obtained from one sampling will never quite coincide with the results obtained by measuring another sample. Nor will the statistical constants used agree with those obtained if it were possible to measure the whole universe from which these samples were selected. The *reliability* of certain statistical constants which may be determined by the use of certain formulas indicates the stability of a constant from sample to sample.

In addition to sampling errors statistical data may carry within them the results of response errors. Response errors may be measured or indicated by a variation in score earned by an individual on the same test or equally difficult forms of a test given two or more times. These errors may be due to changes in the method of administering the tests from time to time, unreliability of the tests themselves, the effect of practice, if the tests are given with too short an interval intervening, and changes in the physical and mental status of the individuals being tested.

Correlation coefficients may be corrected for response errors or attenuation by the use of the following formula:

$$r_{st} = \frac{r_{12}}{\sqrt{r_{1I}\, r_{2II}}}$$

where r_{st} is the average or true correlation, r_{12} is the observed correlation, and r_{1I} r_{2II} are the reliability coefficients of the tests being correlated.

If the results of measuring two variables are plotted on a correlation sheet and are found to be linear, i. e., the means of the arrays adhere fairly closely to a straight line, then r may replace the n or correlation ratio as the measure of relationship between the two variables. Frequently, when the correlation ratio is larger than the r it is necessary to apply a test for linearity to determine which measure shall be used to indicate the degree of relationship sought.

The difference between n and r is not to be regarded as significant if n^2 minus r^2 is small in comparison with r, and

$$\sqrt{N} \qquad \sqrt{n^2 - r^2} < 4.047$$

This formula is known as Blakeman's short test for linearity. Insofar as the relationships are not linear the coefficient of correlation is not a complete and accurate measure of the relationship. In the case of partial correlations the inaccuracy resulting from using the r when the regression is non-linear increases, since partial correlations will carry a composite of the inaccuracies involved in the zero correlation coefficients.

Blakeman's test for linearity has been applied to the regressions used in this study. While the actual regressions have been plotted and appear in the original copy, the results are shown in summary form in Table VIII-A, page 44, and in Table XVIII-A, page 56.

Table VIII, page 43, shows the correlations and partial correlations between growths in the factors on which the groups were equated plus the factor of history achievement. The correlation between growth in History Reading and growth in ability to use History Vocabulary in Composition for the experimental group, from November to May, is .823 $\pm$ .022. With the influence of Mental Age partialed out the correlation is .823 $\pm$ .022; with History Achievement partialed out the correlation is .803 $\pm$ .025; and with both of the latter factors held constant the correlation is .823 $\pm$ .022

For the control group the correlation between History Reading growth and growth in ability to use History Vocabu-

lary in Composition for the entire period of the experiment is —.136 ± .05. When the influence of Mental Age is held constant the coefficient of correlation between growths in these two measures is found to be —.146 ± .068; with History Achievement partialed out the correlation is .007 ± .07; and with both Mental Age and History Achievement held constant the correlation is .014 ± .07.

TABLE VIII

Coefficients of Correlation and Partial Correlations Between Intelligence (1) Growth in Ability to Read History, (2) Growth in Ability to Use History Vocabulary in Composition, (3) and Growth in History Achievement, (4) for Original Equated Groups: November to May

	Experimental			Control		
	(1) Intelligence	(2) Hist. Read.	(3) Voc. in Composition	(1) Intelligence	(2) Hist. Read.	(3) Voc. in Composition
(2) Hist. Read.	r12 .021 ±.071			r12 —.027 ±.070		
(3) Voc. in Composition	r13 .057 ±.071	r23 .823 ±.022		r13 .563 ±.048	r23 —.136 ±.069	
(4) History Achievement	r14 .152 ±.070	r24 —.058 ±.071	r34 —.041 ±.071	r14 .359 ±.061	r24 —.424 ±.058	r34 .478 ±.054
	r23.1 .823 ± .022			r23.1 —.146 ± .068		
	r23.4 .803 ± .025			r23.4 .007 ± .070		
	r23.14 .823 ± .022			r23.14 .014 ± .070		

Table IX, page 45, gives the coefficients of correlation and partial correlation between the factors on which the original groups were equated. These correlations are for the unequated groups as of November. By referring to this table it will be seen that the coefficient of correlation between History Reading and the ability to use History Vocabulary in Composition for the experimental group is .628 ± .042. With Mental Age held constant the correlation is .278 ± .064. It

will be seen also that for the control group the coefficient of correlation between History Reading and ability to use History Vocabulary in Composition is .575 ± .046. With the influence of Mental Age partialed out the correlation is .283 ± .064.

TABLE VIII-A

Summary of the Regressions as Derived from Plotting the Correlations Between Mental Age, History Reading Growth, and History Vocabulary in Composition Growth, as shown in Table VIII

	x	y	r_{xy}	n_{xy}	n_{yx}	$\sqrt{N}$	$\sqrt{n^2 - r^2}$
Experimental Group	M.A.	History Reading Growth	.021 ±.07	.242 ±.06	.411 ±.05	9.38	.411
Control Group	M.A.	History Reading Growth	—.027 ±.07	.161 ±.06	.404 ±.05	9.53	.404
Experimental Group	M.A.	History Voc. in Composition Growth	.057 ±.07	.184 ±.06	.362 ±.06	9.38	.358
Control Group	M.A.	History Voc. in Composition Growth	.563 ±.04	.577 ±.04	.700 ±.03	9.53	.417
Experimental Group	Hist. Voc. in Comp. Growth	Hist. Read. Growth	.823 ±.02	.840 ±.02	.834 ±.02	9.38	.134
Control	Hist. Voc. in Comp. Growth	Hist. Read. Growth	—.136 ±.06	.187 ±.06	.148 ±.06	9.53	.054

In determining correlation coefficients an error is introduced by a coarse grouping of the data. While corrections may be applied to the results in order to eliminate the error due to grouping, corrective formulas have not been used with the data in this investigation. It is conceivable that if the

coarseness of the grouping had been taken into consideration, and if formulas for correcting the error due to this coarseness had been applied, the coefficients of correlation would have been larger.

The results presented seem to provide evidence in support of the hypothesis that growth in the experimental variable, i. e., the ability to use history language meaningfully in composition will accompany growth in the ability to read

TABLE IX

Coefficients of Correlation and Partial Correlations Between Intelligence (1) Ability to Read History, (2) and Ability to Use History Vocabulary in Composition, (3) for Original Unequated Groups: November Scores

	Experimental		Control	
	(1) Intelligence	(2) History Reading	(1) Intelligence	(2) History Reading
(2) History Reading	r 12 .776 ±.027		r 12 .634 ±.041	
(3) Composition Vocabulary	r 13 .628 ±.042	r 23 .628 ±.042	r 13 .545 ±.048	r 23 .575 ±.046
	r12.3 .631 ±.042		r12.3 .468 ±.054	
	r13.2 .287 ±.064		r13.2 .286 ±.064	
	r23.1 .287 ±.064		r23.1 .283 ±.064	

history material. In both the experimental and control groups, with the influence of mental age held constant, the correlations between ability to read history and ability to use history vocabulary in composition were almost identical, being .287 ± .064, and .283 ± .064. On the other hand, the correlations between growths in these two variables were far apart, being .823 ± .022 for the experimental group, and —.146 ± .068 for the control group, with mental age partialed out; and with history achievement partialed out, .803 ± .025 for the experimental group and .007 ± .07 for the control group. Considering these figures together with the fact that the pupils in the experimental group made significant gains over the control

group in ability to read history and in ability to use history vocabulary in composition, it would seem safe to say that the growth shown in ability to read history on the part of the experimental group is closely related to a corresponding growth in ability to use history vocabulary in composition.

Inspection of the coefficients of partial correlation will reveal that the influence of achievement in history affected the relationship between history reading ability and ability to use history vocabulary in composition but slightly.

CHAPTER V

Results for Groups Equated in February

When the time came for the February testing, a measure of the use of history vocabulary had been devised which was believed to be more objective than the one used in the original equating of the groups. This test has been referred to as

TABLE X

Frequency Distributions of Scores in Tests Measuring Ability to Read History and Ability to Use History Vocabulary in Completion Sentences for Two Previously Equated Groups of Sixth Grade Pupils from Which Equated Groups Were Drawn in February

Scores	Experimental		Control	
	History Reading	Voc. in Completion	History Reading	Voc. in Completion
40-44	11	0	3	0
35-39	17	5	6	0
30-34	8	13	9	9
25-29	21	18	28	14
20-24	17	20	27	34
15-19	11	15	15	19
10-14	2	12	2	11
5-9	1	5	1	3
0-4	0	0	0	1
N	88	88	91	91
Mean	28.97	22.78	25.46	21.29
P. E.	.62	.57	.47	.45
S. D.	8.6	7.9	6.7	6.4
P. E.	.43	.40	.33	.32

a test of the use of History Vocabulary in Completion Sentences, and was discussed on page 25. This test was administered to all children in the experiment in February, and two groups were equated on the basis of the results of tests of mental ability, ability to read history, and ability to use history vocabulary in completion sentences.

Table X, page 47, gives the distributions of scores in

History Reading and scores in the use of History Vocabulary in Completion Sentences for the pupils in the experiment in February from which these equated groups were drawn.

Table XI, page 48, gives the Mental Age distributions for these equated groups; Table XII, page 49, gives the distri-

TABLE XI

FREQUENCY DISTRIBUTIONS OF MENTAL AGE FOR TWO MATCHED GROUPS OF SIXTH GRADE CHILDREN, EXPERIMENTAL AND CONTROL: FEBRUARY SCORES, SECOND GROUPING

Mental Age	Experimental	Control
185-189	0	1
180-184	3	1
175-179	0	0
170-174	2	3
165-169	6	5
160-164	4	4
155-159	6	8
150-154	7	9
145-149	11	9
140-144	5	4
135-139	6	11
130-134	4	12
125-129	6	4
120-124	6	5
115-119	5	5
110-114	3	2
105-109	2	2
100-104	0	0
95-99	1	0
90-94	1	0
N	78	85
Mean	142.05 ± 1.51	143.02 ± 1.27
S. D.	20.0 ± 1.08	17.3 ± .89

butions of the initial scores in History Reading and in the use of History Vocabulary in Completion Sentences; Table XIII, page 50, gives a summary of the initial status of these two groups.

After equating, the experimental group contained 78 children, while the control group contained 85.

After a period of thirteen weeks, continuing from February to May, these two groups were tested again. The same tests were used as those used in the February testing.

The distributions of scores on the February and May tests in History Reading for the two equated groups are given in Table XIV, page 51.

TABLE XII

FREQUENCY DISTRIBUTION OF INITIAL (FEBRUARY) SCORES IN TESTS MEASURING ABILITY TO READ HISTORY AND ABILITY TO USE HISTORY VOCABULARY IN COMPLETION SENTENCES FOR EXPERIMENTAL AND CONTROL GROUPS—SECOND GROUPING

	Experimental		Control	
	Reading History	Voc. in Completion S.	Reading History	Voc. in Completion S.
40-44	4	0	5	0
35-39	15	4	6	0
30-34	7	12	10	9
25-29	21	13	25	14
20-24	17	18	25	31
15-19	11	14	14	18
10-14	2	12	0	10
5-9	1	5	0	3
N	78	78	85	85
Mean	27.50	22.24	26.56	21.62
P. E.	.60	.67	.49	.45
S. D.	7.9	8.0	6.7	6.2
P. E.	.42	.43	.34	.32

The summary of results is given in Table XV, page 52.

The distributions of scores on the February and May tests in the use of History Vocabulary in Completion Sentences are given in Table XVI, page 52.

The summary of results is given in Table XVII, page 53.

During the time that these equated groups were observed—from February to May—the pupils in the experimental group and in the control group gained in History Reading. The pupils in the experimental group, however, gained more than did the pupils in the control group. The difference in favor

TABLE XIII

SUMMARY OF INITIAL STATUS OF TWO GROUPS OF SIXTH GRADE PUPILS EQUATED ON THE BASIS OF MENTAL AGE AND FEBRUARY SCORES IN TESTS MEASURING ABILITY TO READ HISTORY AND ABILITY TO USE HISTORY VOCABULARY IN COMPLETION SENTENCES *

Group	No. of Cases	Mental Age				February Scores							
						History Reading				History Vocabulary			
		Mean	P. E.	S. D.	P. E.	Mean	P. E.	S. D.	P. E.	Mean	P. E.	S. D.	P. E.
Experimental	78	142.05	1.51	20.0	1.08	27.5	.60	7.9	.42	22.24	.67	8.08	.43
Control	85	143.02	1.27	17.3	.89	26.5	.49	6.7	.34	21.62	.45	6.24	.32

* New test introduced in February and used as one of the factors for equating these groups within the original groups which began the experiment in November. See pages 25 and 47.

of the experimental group is 2.46 ± .52. The critical ratio of this difference is 4.7, and is, therefore, significant.

During the same period both groups made gains in ability to use History Vocabulary in Completion Sentences. The gain made by the experimental group exceeded that made by the control group. The difference in favor of the experimental group in this case is 5.82 ± .51. Since the critical ratio is 11.4, it is a significant difference.

TABLE XIV

FREQUENCY DISTRIBUTIONS OF SCORES IN TESTS MEASURING ABILITY TO READ HISTORY FOR TOTAL EXPERIMENTAL AND CONTROL GROUPS IN FEBRUARY AND MAY: SECOND GROUPING

	Experimental		Control	
	Feb.	May	Feb.	May
45-49	0	0	0	1
40-44	4	6	5	2
35-39	15	18	6	6
30-34	7	18	10	19
25-29	21	22	25	29
20-24	17	7	25	21
15-19	11	5	14	7
10-14	2	2	0	0
5-9	1	0	0	0
N	78	78	85	85
Mean	27.50	30.6	26.56	27.8
P. E.	.60	.54	.49	.44
S. D.	7.9	7.1	6.7	6.0
P. E.	.42	.38	.34	.31

The summary of the results of tests measuring ability to read history given in Table XV shows only the means and the standard deviations of the distributions. Graph III, page 53, presents the detailed results of the testings in cumulative percentages. The graph shows the percentile rank of the experimental and control groups for February and May. It is presented in order that the differences between the amount and character of growth for the two groups may be shown more clearly.

TABLE XV

SUMMARY OF RESULTS OF TESTS MEASURING ABILITY TO READ HISTORY FOR TOTAL EXPERIMENTAL AND CONTROL GROUPS: EQUATED IN FEBRUARY

		Scores in Reading History						
	No. of	February			May			
Group	Cases	Mean	P. E.	S. D.	P. E.	Mean	P. E.	S. D.	P. E.
Experimental	78	27.5	.60	7.9	.42	30.64	.54	7.1	.38
Control	85	26.56	.49	6.7	.34	27.85	.44	6.0	.31

Gains in Reading History

Group	No. of Cases	Gain February to May Mean	P. E.	S. D.	P. E.
Experimental	78	3.91	.42	5.54	.29
Control	85	1.44	.31	4.34	.22
Difference in Favor of Experimental Group		2.46	.52		

The coefficient of correlation between the February and May results of tests measuring ability to read history was $.655 \pm .043$ for the experimental group; $.734 \pm .033$ for the control group.

TABLE XVI

FREQUENCY DISTRIBUTIONS OF SCORES IN TESTS MEASURING ABILITY TO USE HISTORY VOCABULARY IN COMPLETION SENTENCES FOR TOTAL EXPERIMENTAL AND CONTROL GROUPS IN FEBRUARY AND MAY: SECOND GROUPING

	Experimental		Control	
	Feb.	May	Feb.	May
35-39	4	24	0	6
30-34	12	17	9	9
25-29	13	19	14	17
20-24	18	6	31	22
15-19	14	8	18	16
10-14	12	1	10	9
5-9	5	2	3	6
0-4	0	1	0	0
N	78	78	85	85
Mean	22.24	29.2	21.62	22.5
P. E.	.67	.61	.45	.40
S. D.	8.0	8.1	6.2	7.9
P. E.	.43	.43	.32	.40

TABLE XVII

SUMMARY OF RESULTS OF TESTS MEASURING ABILITY TO USE HISTORY VOCABULARY IN COMPLETION SENTENCES FOR TOTAL EXPERIMENTAL AND CONTROL GROUPS: EQUATED IN FEBRUARY

Group	No. of Cases	Scores in History Vocabulary: Completion February Mean	P. E.	S. D.	P. E.	May Mean	P. E.	S. D.	P. E.
Experimental	78	22.24	.67	8.0	.43	29.23	.61	8.1	.43
Control	85	21.62	.45	6.2	.32	22.55	.57	7.9	.40

Gains in History Vocabulary in Completion Sentences

Group	No. of Cases	Gain February to May Mean	P. E.	S. D.	P. E.
Experimental	78	7.44	.48	6.3	.34
Control	85	1.62	.17	2.4	.12
Difference in Favor of Experimental Group		5.82	.51		

The coefficient of correlation between the February and May results of tests measuring ability to use history vocabulary in completion sentences was .701 ± .038 for the experimental group; .936 ± .009 for the control group.

GRAPH III

CUMULATIVE PERCENTAGE OF CHILDREN OF THE GROUPS EQUATED IN FEBRUARY AT THE VARIOUS SCORE LEVELS IN HISTORY READING: FEBRUARY AND MAY

Score	Experimental Feb.	Experimental May	Control Feb.	Control May
Under 50				100
Under 45	100	100	100	98.8
Under 40	94.8	92.3	94.1	96.4
Under 35	75.6	69.2	87.0	89.4
Under 30	66.6	46.1	75.2	67.0
Under 25	39.7	17.9	45.8	32.9
Under 20	17.9	9.0	16.5	8.2
Under 15	3.8	2.5	0	0
Under 10	1.3	0	0	0
Medians	26.9	30.8	25.7	27.5

A study of the cumulative percentages discloses the changes in all levels of test difficulty. In February, for example, 66.6% of the experimental group and 75.2% of the control group made scores less than 30. In May the experimental group had 46.1% of its members making scores less than 30, while the control group had 67.0% of its members with scores less than 30. This is a difference of 12.3 in favor of the experimental group.

By referring to Table XVII, it will be noticed that during

GRAPH IV

CUMULATIVE PERCENTAGE OF CHILDREN OF THE GROUPS EQUATED IN FEBRUARY AT THE VARIOUS SCORE LEVELS IN HISTORY VOCABULARY IN COMPLETION SENTENCES: FEBRUARY AND MAY

Score	Experimental		Control	
	Feb.	May	Feb.	May
Under 40	100	100		100
Under 35	94.8	69.2	100	92.9
Under 30	79.4	47.4	89.4	82.3
Under 25	62.9	23.0	72.9	62.3
Under 20	39.7	15.4	36.5	36.5
Under 15	21.8	5.1	15.3	17.6
Under 10	6.4	3.8	3.5	7.0
Under 5	0	1.3	0	0
Medians	22.2	30.6	21.8	22.6

the period under discussion both groups made gains in ability to use history vocabulary in completion sentences. The children in the experimental group who had had the advantage of consistent training in vocabulary development gained more in ability to use vocabulary than did the children who had not had this training. The gain in favor of the experimental group is $5.82 \pm .51$, with a critical ratio of 11.4. This difference is significant.

Since the summary of results presented in Table XVII does not give the detailed results of the two testing periods for the two groups, Graph IV, page 54, is presented. A study of the cumulative percentages reveals the changes in all levels of test difficulty. In February 79.4% of the mem-

bers of the experimental group and 89.4% of the members of the control group made scores less than 30. In May 47.4% of the experimental group and 82.3% of the control group made scores less than 30. This represents an excess gain of 25 for the experimental group.

It has been shown that the growths made by the experimental group for the period under consideration are statistically significant. In order to show the relationships between these growths, Table XVIII, page 55, gives the correlations

TABLE XVIII

Coefficients of Correlation and Partial Correlations Between Intelligence (1) Growth in Ability to Read History, (2) and Growth in Ability to Use History Vocabulary in Completion Sentences, (3) for Total Groups Equated in February: February to May

	Experimental		Control	
	(1) Intelligence	(2) History Reading	(1) Intelligence	(2) History Reading
(2) History Reading	r12 —.213 ±.072		r12 —.152 ±.071	
(3) Completion Vocabulary	r13 —.408 ±.063	r23 .718 ±.036	r13 .570 ±.049	r23 —.143 ±.071
	r12.3 .795 ± .027		r12.3 .087 ± .072	
	r13.2 —.827 ± .023		r13.2 .561 ± .050	
	r23.1 .901 ± .014		r23.1 —.070 ± .073	

and partial correlations between the factors on which these groups were equated. The correlation between growth in history reading and growth in ability to use history vocabulary for the experimental group is .718 ± .036. With the influence of intelligence partialed out the correlation is .901 ±.014. Since the data presented in Chapter IV showed that the influence of History Achievement on the relationship between growth in history reading ability and growth in history vocabulary was negligible, and since the pupils in the groups equated in February, with the exception of 16, were the same as those in the groups equated in November, it was considered

unnecessary to include History Achievement in presenting the results pertaining to the groups equated in February.

For the period from February to May for the control

TABLE XVIII-A

Summary of the Regressions as Derived from Plotting the Correlations Between Mental Age, History Reading Growth, and Growth in Use of History Vocabulary in Completion Sentences, as shown in Table XVIII

	x	y	r_{xy}	n_{xy}	n_{yx}	$\sqrt{N}$	$\sqrt{n^2 - r^2}$
Experimental Group	M.A.	History Reading Growth	—.213 ±.07	.344 ±.06	.349 ±.06	8.83	.276
Control Group	M.A.	History Reading Growth	—.152 ±.07	.187 ±.07	.424 ±.06	9.22	.395
Experimental Group	M.A.	Growth in Voc. in Completion Sentences	—.408 ±.06	.496 ±.05	.514 ±.05	8.83	.313
Control Group	M.A.	Growth in Voc. in Completion Sentences	.570 ±.04	.574 ±.04	.615 ±.04	9.22	.314
Experimental Group	Growth in Voc. in Completion Sentences	History Reading Growth	.718 ±.03	.786 ±.02	.783 ±.02	8.83	.312
Control Group	Growth in Voc. in Completion Sentences	History Reading Growth	—.143 ±.07	.236 ±.06	.158 ±.07	9.22	.067

group the correlation between History Reading growth and growth in ability to use History Vocabulary in Completion Sentences is —.143 ± .071. When the influence of Mental Age is partialed out the coefficient of correlation between these two measures is —.070 ± .072.

Table XIX, page 57, gives the coefficients of correlation and partial correlation between the factors on which these groups were equated in February. The data presented in this table are for the groups before they were equated. Reference to this table will reveal that the coefficient of correlation between History Reading and ability to use History Vocabulary in Completion Sentences is .519 ± .025 for the experimental group. With Mental Age held constant the correlation is .263 ± .066. Growths in these two measures show a cor-

TABLE XIX

Coefficients of Correlation and Partial Correlations Between Intelligence (1) Ability to Read History, (2) and Ability to Use History Vocabulary in Completion Sentences, (3) for Total Groups Equated in February—February Scores

	Experimental		Control	
	(1) Intelligence	(2) History Reading	(1) Intelligence	(2) History Reading
(2) History Reading	r12 .590 ±.046		r12 .654 ±.040	
(3) Completion Sentences Vocabulary	r13 .591 ±.046	r23 .519 ±.052	r13 .651 ±.040	r23 .550 ±.049
	r12.3 .391 ±.060		r12.3 .467 ±.055	
	r13.2 .398 ±.060		r13.2 .462 ±.055	
	r23.1 .263 ±.066		r23.1 .218 ±.067	

relation of .718 ± .036, with Mental Age held constant, a correlation of .901 ± .014. This table also shows for the control group that the coefficient of correlation between History Reading and ability to use History Vocabulary in Completion Sentences is .550 ± .049. With Mental Age held constant the correlation is .218 ± .067. However, the correlation of growths in these two measures, given in Table XVIII, is —.143 ± .071. With the influence of Mental Age partialed out the correlation between the growths is

$-.070 \pm .072$. It will be noticed that the latter two correlation coefficients are not significant.

In the case of both groups the coefficients of correlation between the original scores in History Reading and use of History Vocabulary were lowered when the Mental Age was partialed out. When the correlations between growths in the two abilities being measured are considered it is found, however, that to partial out Mental Age increases the positive correlation in the experimental group, while it increases the negative correlation in the control group. Considering these figures together with the fact that the pupils in the experimental group made significant gains over the control group in History Reading and in ability to use History Vocabulary in Completion Sentences, it would seem safe to say that the growth shown in ability to read history on the part of the experimental group was closely related to improvement in the ability to use history vocabulary.

CHAPTER VI

Summary

The purpose of this study is the investigation of the relation of ability to use history vocabulary in written composition and in completion sentences to the ability to read history material.

Two groups of children from the sixth grades of the schools of Talbot County, Maryland were compared on the basis of intelligence, ability to read history material of Old World Background type, and ability to use history vocabulary meaningfully in written composition. Within the original equated groups two other groups were compared on the basis of intelligence, ability to read history, and ability to use history vocabulary in written-completion sentences. In each case one group was given instruction in history by a method which provided for a large amount of oral and written discussion as well as use of visual materials, with the accompanying emphasis placed on vocabulary development prior to the pupils' reading the history content. The comparable group, in each case, was taught by a method which did not provide for emphasis on vocabulary usage and development.

The original experimental and control groups were equated on the basis of November scores on tests. These groups were tested again in February and in May. Growth was measured for two periods of the experiment: from November to February, and from November to May. Gains were measured by administering identical tests each time with the exception of the intelligence test which was given but once.

The groups equated within the original groups after the experiment began were equated on the basis of February test scores. These groups were tested again in May. Growth was measured from February to May. Identical tests were administered each time.

In computing the results of the experiment the total groups equated in November and the groups within these groups, equated in February on a different basis, were used.

In interpreting the results of this study attention should be called to three limitations; (1) the number of children included in the experiment, (2) the local nature of the experiment, and (3) the imperfections inherent in the tests devised to measure the ability to use history vocabulary.

Under conditions which obtained in this experimental study the findings seem to indicate that:

1. Growth in ability to use history vocabulary in composition was more consistent throughout the period of the experiment than was growth in ability to read history.
2. Growth in ability to use history vocabulary in written completion sentences was more consistent during the time that this factor was the experimental variable than was growth in ability to read history.
3. Although the coefficients of correlation between history reading and intelligence are greater than or equal to the coefficients of correlation between history reading and the ability to use history vocabulary, the coefficients of correlation between growths in the two abilities measured are larger than the correlations between intelligence and growth in the two abilities for the experimental groups.

Since the results of educational research are valuable to the extent that they affect practice, the following implications pertinent to this investigation might be given:

1. By giving training in the meaningful use of the vocabulary of history, the reading of history material will be facilitated.
2. The building of history concepts together with supplying the proper vocabulary for these concepts seems to provide a readiness for the reading of history material.
3. Unless adequate experience relative to the ideas presented in, or symbolized by, words in the reading material is provided, pupils will receive training in the use of words and will often be able to make satisfactory scores on written tests without having secured a true

understanding regarding the ideas set forth in the textual material.

4. Just as an adequate teaching method should be more than mere verbal presentation so also should the responses of children be more than verbal responses. The use of concrete materials wherever possible, the use of dramatization, when feasible, the use of field trips, and the building of models should all be employed to make history material more graphic and more meaningful.

CHAPTER VII

Conclusions

1. The majority of the children in the experiment learned to read history regardless of the method employed by the teacher.
2. The ability to read history can be improved by giving attention to the development of history vocabulary.
3. Apparently one of the factors which determines the specific nature of reading material is the vocabulary in which the material is written.
4. Varied activities should be employed in order that children may develop adequate comprehension of history vocabulary and adequate ability to employ the vocabulary comprehended.
5. In order to develop an adequate background for the reading of sixth grade history material the method employed should take into account the process of learning to read.
6. There seems to be a definite relation among aural comprehension, verbal expression, and reading. When the ability to comprehend aurally and the ability to express verbally are well developed, the ability to read is improved.

Problems for Further Study

1. Since no check was made on the effectiveness of the various types of activities which served to develop history vocabulary, greater light might be thrown on the whole question of vocabulary development by investigations which would seek to compare the effectiveness of several types of teaching activities, such as, dramatization, story-telling, building models, and illustrating.
2. More adequate work along the line of developing tests or scales for the purpose of measuring children's written responses in history needs to be done. In this particular study the task of devising a satisfactory means of measur-

ing the use of vocabulary in written composition was a difficult one.

3. Similar investigations in phases of history other than the Old World Background division of elementary school history might prove satisfactory and profitable.
4. The use of the oral interview technique in order to determine the relation between history reading ability and ability to use history vocabulary might serve to enrich the understanding of the total reading process.

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